2 9 0024

SITE: Barite Hill
BREAK: 2.9
OTHER:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

SEP 1 2009

ACTION MEMORANDUM

SUBJECT: Request for a Removal Action Ceiling Increase at the Barite Hill Mine Site McCormick, McCormick County, South Carolina

FROM: Jordan Garrard
On-Scene Coordinator

THRU: Shane Hitchcock, Chief
Emergency Response & Removal Branch

TO: Franklin E. Hill, Director
Superfund Division

I. PURPOSE

The purpose of this Action Memorandum is to request and document approval of a ceiling increase for the removal action at the Barite Hill Mine Site (the Site), located in a wooded area 3 miles south of McCormick, South Carolina. The Site poses a threat to public health and the environment which meets the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) section 300.415(b) criteria for removal actions.

Initial response actions were taken at the Site under the On-Scene Coordinator (OSC) $250,000 authority to provide prompt risk reduction through expedited action. The Action Memorandum dated September 19, 2007 described response actions to be implemented at the Site and included securing the Site, deactivation of cyanide, prevention of catastrophic releases of acidic metals laden water, neutralization and/or treatment of over 65,000,000 gallons of acidic metals laden water, and capping and/or containment of the principal significant source, an estimated 250,000 cubic yards (CYS) of acid generating pyritic waste rock.

A ceiling increase of $300,000 is necessary to address erosion problems and produce ground cover vegetation on the cap constructed during the time-critical removal action.

As the result of the Site conditions, immediate removal actions conducted pursuant to Section 104 of CERCLA are needed at the Site. The total project ceiling, if approved, will be $4,980,000 of which an estimated $3,870,000 comes from the Regional Removal Allowance.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

Site ID Number: A4NZ
Type: Time-Critical Removal

1. Removal Site Evaluation

The Barite Hill Mine was operated as a surface mine with cyanide heap-leaching for gold recovery starting in 1991. Mining ended in October 1994 and leaching and gold recovery ended in 1995 when mine reclamation was initiated. The company, Nevada Goldfields, suspended site reclamation when they entered into bankruptcy in 1999. The gold ore and much of the waste rock at the mine contains significant amounts of pyrite which is the source of acid rock drainage at the Site.

South Carolina Department of Health and Environmental Control (DHEC) referred the Site to the Environmental Protection Agency (EPA) Emergency Response and Removal Branch (ERRB) in November 2006. ERRB, EPA Environmental Response Team (ERT), Department of Interior/Bureau of Reclamation (BOR) and DHEC conducted an onsite assessment as part of a Removal Site Evaluation (RSE) of the over 795-acre site (disturbed area 135 acres) during the week of March 27, 2007.

The assessment scope included process waste sampling/evaluations, process pond sampling/evaluations, biological assessment of the receiving creek, a site inventory of features, facilities, relevant records, and an identification of various environmental issues and physical hazards at the Site.

During the assessment, the OSC discovered conditions at the Site that required emergency response actions whose scope included an onsite neutralization of approximately 2,000 lbs of incompatible strong acids and bases, posting of warning signs, community notifications and the destruction and onsite disposal of the metal oxide laden melting furnace/assay structure. Extensive coordination was conducted with the DHEC and the community including a public meeting held in May 2007. Trespasser activity has been well documented including hunting and off-road activity.

The completion of the assessment yielded the following areas of concern:

1. The 10-acre, 65,000,000 gallon Barite Hill Pit Lake (Acid Pit) has been documented as having a pH of 2 and below with -3.9 pH being documented after a significant rainfall. These pH levels characterize

the Acid Pit waters as a Resource Conservation and Recovery Act (RCRA) hazardous waste (D002). In addition, the primary acid in the Acid Pit is sulfuric acid which is a CERCLA listed hazardous substance. Concurrent to maintaining a 5-gallon per minute (gpm) seep rate, the Acid Pit has been filling up since its abandonment and will likely overflow with normal rainfall within 3 to 5 years to a tributary of Hawe Creek which travels approximately 4 miles before entering into the Hawe Creek State Campground and reaching Strom Thurmond Lake, a recreational lake and drinking water reservoir. The Acid Pit continues to be fed by the rainfall and runoff which reacts with an estimated 250,000 CY pyritic waste rock source. While this source is the overwhelming acid source to the Acid Pit, additional sources exist in the form of exposed pyritic veins in the cliff faces.

2. The low side bearing wall of the Acid Pit was not constructed to be a dam, but is serving as one. In the event of a significant series of rain events and/or erosion, it is likely that the wall will fail and the Acid Pit will discharge up to 40 to 60 acre feet of water resulting in significant impacts to biota and increased risk of exposure to the community. Currently, a network of beaver dams is assisting in capturing and buffering the acid drainage. In the event of a catastrophic release, it is likely that the beaver ponds/dams will fail and release a significant amount of metals laden sediment. Metals of environmental interest at the site include arsenic, cobalt, copper, iron, lead, manganese, selenium and zinc.

3. Currently, an approximate 5 gpm seepage rate has been ongoing from the Acid Pit and has negatively impacted the tributary for 1 mile with pH recordings between 2 and 4. After a mile downstream, the creek is diluted by Hawe Creek proper and the pH recordings return to a background range between 6 and 7.

4. Cyanide was deactivated as part of prior reclamation, but cyanide concentrations were identified in the sump of the Permanent Heap Pregnant Pond at 30,000 ppb aqueous. Acceptable Region 9 Preliminary Remedial Goals (PRG) for human health concerning aqueous cyanide is 30 ppb. The uncontrolled nature of the ponds allows access to trespassers. Several dead animals as large as cattle have been documented on Site close to the ponds. The uncontrolled access to the disturbed areas of the Site is indicative of Site conditions.

5. Beyond the scope of this removal action, but worthy of mention is the condition of the current clay capped repositories. The caps show signs of distress from multiple sources including surface erosion, cracking of

the clay, and acid poisoning of vegetation. Surface drainage diversion ditches, located at the bottom of the repositories, are showing signs of severe erosion, which left unchecked in subsequent years will cause significant damage to the waste cap structures and add to the volume of acid mine seepage from the Site as a whole.

In summary, a listed CERCLA hazardous substance (sulfuric acid) which also exists in the Acid Pit waters as a RCRA hazardous waste (D002) continues to be released and is a threat for a catastrophic release. This Site meets criteria for a removal action as outlined in 300.415(b).

The areas of concern for the removal action can be prioritized as follows:

1. Securing access to the uncontrolled Site.
2. The Acid Pit and the uncontrolled pyritic waste rock sources.
3. Cyanide in the Permanent Heap Pregnant Pond Sump.

2. Physical Location

The Barite Hill Mine Site is located in a wooded area 3 miles south of McCormick, South Carolina. It is north of State Road 30 and lies between US Highways 378 and 221.

3. Site Characteristics

The gold deposits at Barite Hill are hosted in igneous and metamorphic rocks which are locally called the "felsic pyroclastic sequence". The original sediments were altered and mineralized by igneous intrusions. All of the rocks were subsequently altered by metamorphic action.

Barite Hill Mine has numerous identifiable features. Included among these features are a total of 7 process ponds and one sediment pond. Three major waste rock repositories exist in varying states of condition. Remnants of a former water treatment facility lie in the far western section of the Site. The Rainsford Pit is a backfilled feature that exists in the southwest section of the Site. An approximate 5-acre area bordering the southern rim of the Acid Pit has already been harvested by prior reclamation efforts to obtain fill material, primarily clay.

In June 2007, the approximate 10-acre existing Acid Pit registered the most acidic water of known documented lake conditions in the world. Based on the Site Inventory Report, the overall Site has been estimated to contain an acid producing potential of over 5,000 years.

While the above information is a condensed summary of highlighted features, a more complete Site characterization can be found in the BOR 2007 Site

Inventory Report as well as the ERT Trip Report for the March 2007 Field Investigation.

4. Release or threatened release into the environment of a hazardous substance or pollutant or contaminant.

During the assessment, the OSC conducted an emergency response whose scope included an onsite neutralization of approximately 2,000 lbs of incompatible strong acids and bases, posting of warning signs and the destruction and onsite disposal of the metal oxide laden furnace/melting structure. Extensive coordination was conducted with DHEC and the community including a public meeting held in May 2007. Trespasser activity has been well documented including hunting and off-road activity.

The 65,000,000 gallons of acidic metals laden water in the Acid Pit has been documented with pH recordings of 2 and below with -3.9 pH being recorded after a significant rainfall. These levels characterize the Acid Pit waters as a RCRA hazardous waste (D002). In addition the acid found in this Acid Pit is the CERCLA listed hazardous substance, sulfuric acid. The Pit has been filling up since its abandonment and will likely overflow with normal rainfall within 3 to 5 years to a tributary of Hawe Creek which travels approximately 4 miles before entering into the Hawe Creek State Campground and reaching Strom Thurmond Lake, a recreational lake and drinking water reservoir.

The Acid Pit continues to be fed by the rainfall and runoff which react with the estimated 250,000 CYS of pyritic waste rock source. While this source is the overwhelming acid source to the Acid Pit, additional sources exist in the form of exposed pyritic veins in the cliff faces.

Furthermore, the low side bearing wall of the Acid Pit is not meant to be a dam, but is serving as one. In the event of a significant series of rain events and/or erosion, it is likely that the wall will fail and the Acid Pit will discharge up to 40 to 60 acre feet of water resulting in significant impacts to biota and increased risk of exposure to the community. Currently, a network of beaver dams is assisting in capturing and buffering the acid drainage. In the event of a catastrophic release, it is likely that the beaver ponds/dams will fail and release significant amount of metals laden sediment. Metals of environmental interest at the site include arsenic, cobalt, copper, iron, lead, manganese, selenium and zinc.

Currently, an approximate 5 gpm seepage rate has been ongoing from the Acid Pit and has negatively impacted the tributary for 1 mile downstream with pH recordings between 2 and 4. After a mile the creek is diluted by Hawe

Creek proper and the pH recordings return to more background oriented pH of 6 and 7.

Cyanide deactivation was conducted as part of the prior reclamation, but cyanide concentrations were identified in the sump of the Permanent Heap Pregnant Pond at 30,000 ppb aqueous. Acceptable PRGs for aqueous cyanide are 30 ppb. The uncontrolled nature of the ponds allows access to trespassers. Several dead animals as large as cattle have been documented on Site close to the ponds.

The erosion of soils surrounding the Acid Pit and on the cap covering the pyritic waste rock poses a threat of release to the environment. Soil erosion on the cap covering the pyritic waste rock will expose the waste rock to the environment allowing for sulfuric acid generation. The sulfuric acid accumulates in the Acid Pit lowering the pH of the water. As erosion of soils surrounding the Acid Pit continues the structural integrity of the surrounding soils degrades and the potential for a catastrophic failure or land slide into the Acid Pit increases. Severe weather events could erode and/or breech the current barrier wall resulting in a catastrophic release of between 40 to 60 acre feet of acidic metals laden water.

In summary, the CERCLA hazardous substance, sulfuric acid and D002 hazardous waste have been released, continue to be released and are a threat for a catastrophic release.

5. NPL Status

This Site is on the NPL. The Site was listed in April 2009.

6. Maps, pictures, and other graphic representations

The 2007 BOR Site Inventory Report contains numerous photographs as well as pertinent maps. An additional graphic resource can be found in the ERT Trip Report for the Field Assessment conducted in March 2007.

B. Other Actions to Date

1. Previous Actions

During the March 2007 assessment, the OSC conducted an emergency response whose scope included an onsite neutralization of approximately 2,000 lbs of incompatible strong acids and bases, posting of warning signs, community notifications and the destruction and onsite disposal of the metal oxide laden melting furnace/assay structure. Extensive coordination was conducted with

DHEC and the community including a public meeting held in May 2007. Trespasser activity has been well documented including hunting and off-road activity.

A time critical removal action began on October 15, 2007. Activities included:

1. Secure Site primarily via fencing around the Site process ponds and the Acid Pit.

2. Deactivate remaining cyanide in solution at the Permanent Heap Leach Pad Pregnant Pond Sump.

3. Mitigate threats posed by the Acid Pit:

    a. Construct a spillway at the low end of the Acid Pit. Using an existing IAG with the BOR, the BOR will be tasked to design a spillway within the context of a 100-year storm event at a minimum.

    b. Mitigate the contribution of the estimated 250,000 CY pyritic waste rock acid source to the Acid Pit.
        i. The estimated 6-acre pyritic waste rock watershed is the major contributor to the acidification of the Acid Pit. The BOR will be tasked with designing a cap and/or containment remedy for this principal source.
        ii. Existing cliff faces also contain exposed sources of pyritic rock which add to the acidification loading during storm events. Funding permitting, alternatives will be evaluated by the BOR for possible implementation.
    c. Neutralize/treatment of the Acid Pit water.

In July 2009, 12,000 gallons of 50% sodium hydroxide solution was added to the Acid Pit to address low pH water on the surface of the Acid Pit. The installation of an advanced monitoring system designed to monitor the waste rock cap and Acid Pit began in July 2009, under the Remedial and Site Evaluation Branch's supervision.

2. Current Actions

Continued technical evaluations are occurring at the Site to further characterize and delineate pertinent information in support of this proposed removal action. Removal operations and maintenance activities include monthly pH and analytical sampling of the Acid Pit and associated seeps.

The Remedial and Site Evaluation Branch are installing an advanced monitoring system to monitor the waste rock cap and Acid Pit.

C. State and Local Authorities Role

1. State and Local Actions to Date

In November 2006, DHEC requested EPA's Emergency Response and Removal Branch to evaluate the Site for consideration of a removal action.

2. Potential for continued State/Local Response

The DHEC has referred this Site to EPA because they do not have sufficient funds to implement this action. The State has verbally agreed to conduct post removal site monitoring and control on an as needed basis and has $750,000 from a reclamation bond for the Site.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

A. Threats to Public Health or Welfare

Sulfuric acid is a CERCLA listed hazardous substance as defined by section 101(14) of the CERCLA and the Acid Pit waters meet RCRA hazardous waste (D002) criteria. CERCLA contaminants, if released from the Site, have the capability of presenting a potential hazard to the general public. The threats come primarily from human exposure to these hazardous substances in the water (i.e., trespassers) as well as a potential for surface or air migration. Direct contact, ingestion, and inhalation of sulfuric acid are the primary pathways of exposure. Continued exposure to the escalating acidity of the mine drainage may cause potential acute and chronic health effects to trespassers.

Site conditions meet the requirements for initiating a time-critical removal action according to criteria listed in Section 300.415 (b) (2) of the NCP:

Section 300.415 (b)(2)(ii): "Actual or potential contamination of drinking water supplies or sensitive ecosystems." The potential for a catastrophic release from the Acid Pit exists. Erosion of soils surrounding the pond especially to the south could cause a land slide or massive influx of water which could cause a release from the Acid Pit. . The Acid Pit has been filling up since 1995 and has the potential for a barrier wall breech releasing 40 to 60 acre feet of acidic metals laden water. The pathway for this potential major release is the Strom Thurmond Lake (within 4 miles of the Acid Pit) which serves as a drinking water reservoir.

Section 300.415 (b)(2)(v): " Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released." Ongoing normal rainfall events already present acidic recharge to the Acid Pit which is currently being released through seeps. Rainfall events are currently producing large amounts of soils to erode from the land surrounding the Acid Pit. The erosion on the cap covering the waste rock can cause the exposure of the pyritic waste rock. Exposure to the pyritic waste rock will generate sulfuric acid which will collect in the Acid Pit, thus lowering the pH. As erosion continues the structural integrity of the surrounding soils degrades and the potential for a catastrophic failure or land slide into the Acid Pit increases. Severe weather events could erode and/or breech the current barrier wall resulting in a catastrophic release of between 40 to 60 acre feet of acidic metals laden water.

Section 300.415 (b)(2)(vii): "The availability of other appropriate federal or state response mechanisms to respond to the release." There are no other appropriate federal or state response mechanisms to take responsibility for this removal action.

B. Threats to the Environment

Site conditions meet the requirements for initiating a time-critical removal action according to criteria listed in Section 300.415 (b)(2) of the NCP:

Section 300.415 (b)(2)(ii): "Actual or potential contamination of drinking water supplies or sensitive ecosystems." The potential for a catastrophic release from the Acid Pit exists. Erosion of soils surrounding the pond especially to the south could cause a land slide or massive influx of water which could cause a release from the Acid Pit. . The Acid Pit has been filling up since 1995 and has the potential for a barrier wall breech releasing 40 to 60 acre feet of acidic metals laden water. The pathway for this potential major release is the Strom Thurmond Lake (within 4 miles of the Acid Pit) which serves as a drinking water reservoir.

Section 300.415 (b)(2)(v): " Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released." Ongoing normal rainfall events already present acidic recharge to the Acid Pit which is currently being released through seeps. Rainfall events are currently producing large amounts of soils to erode from the land surrounding the Acid Pit. The erosion on the cap covering the waste rock can cause the exposure of the pyritic waste rock. Exposure to the pyritic waste rock will generate sulfuric acid which will collect in the Acid Pit, thus lowering the pH. As erosion continues the structural integrity of the surrounding soils degrades and the potential for a catastrophic failure or land slide into the Acid Pit increases. Severe weather events could erode and/or breech the current barrier wall resulting in a catastrophic release of between 40 to 60 acre feet of acidic metals laden water.

The increased loading of acidic metals laden water on both the receiving creek and eventually Strom Thurmond Lake will likely result in episodic and significant impacts to

biota.

Section 300.415 (b)(2)(vii): "The availability of other appropriate federal or state response mechanisms to respond to the release." They are no other appropriate federal or state response mechanisms to take responsibility for this removal action.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of the hazardous substances from this Site, if not addressed by implementing the removal action selected in this Action Memorandum, may present an imminent and substantial endangerment to the public health or welfare or the environment.

V. EXEMPTION FOR STATUTORY LIMITS

Both the 12-month exemption and 2 million dollar exemption were approved in the September 19, 2007 Action Memorandum.

VI. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

1. Construct earthen berms to control on-site surface water drainage and eliminate/repair severe erosion channels.

2. Apply flexible growth medium to assist in surface water drainage, eliminate severe erosion concerns, and promote seed growth.

3. Reseed the Site with a proper seed mixture and fertilizer to promote proper vegetation growth for winter and summer growing seasons.

4. Apply amendment treatments to Acid Pit if low pH surface water reoccurs.

5. Refer the Site back to DHEC following completion of response actions for post removal site monitoring and control of both the Acid Pit and the receiving tributary and creek.

2. Contribution to remedial performance

The Removal Program has coordinated with the Remedial Program to ensure that the removal action shall to the extent practicable contribute to the

efficient performance of the anticipated long-term remedial action as required by the NCP *Section 300.415(d)*. Additionally, the close working relationship between the Removal and the Remedial Programs at the Site ensures that there will be an orderly transition from removal to remedial response activates as provided in the *NCP Section 300.415(g)*.

3. Description of alternative technologies

No alternative technologies have been determined at this time.

4. Environmental Evaluation/ Cost Analysis (EE/CA)

This is a time-critical removal action, and an EE/CA is not required.

5. Applicable or relevant and appropriate requirements (ARAR)

In accordance with Section 300.415(i) of the NCP, onsite removal actions conducted under CERCLA are required to attain ARARs to the extent practicable, considering the exigencies of the situation. While administrative requirements need not be met for onsite applicable and/or relevant and appropriate requirements, substantive requirements will be met to the extent practicable for both applicable and/or relevant and appropriate requirements. Practicability is based on an evaluation of the degree of urgency and the scope of the removal action. Off-site removal activities need only comply with all applicable federal and state laws, unless there is an emergency.

Extensive evaluation and coordination for ARARs considerations during the RSE has occurred with the State. The OSC informed DHEC officials during the August and September 2007 concept design phase of the actions to be performed that the performance of a CERCLA-funded removal action was being contemplated and requested them to identify potential State ARARs for this Site. DHEC has been delegated NPDES authorities, and it has been identified and considered in the selection of the response action. The removal action will reduce the toxicity of waters discharging from the Acid Pit by neutralization/treatment of its waters and control of contaminated runoff into the Acid Pit. However, constructing and operating a wastewater treatment system to meet NPDES discharge requirements is beyond the scope of this removal action. Any surface water direct discharge effluent limitations will not be applied during this removal action although best practicable efforts will be considered and implemented. This has been agreed to by the DHEC representatives.

6. Proposed Schedule

Response actions at the Site will continue upon approval of this Action

Memorandum. The additional removal action necessary to address Site threats identified in this AM, is expected to take between 2 and 3 months and is highly dependent on weather conditions.

B. Estimated Costs

Extramural Costs:	*Current Ceiling*	*Proposed Increase*	*Proposed Ceiling*
Regional Allowance Cost:			
ERRS Contractor	$3,620,000	$250,000	$3,870,000
Non-Regional Allowance Cost:			
START	$450,000	$50,000	$500,000
Bureau of Reclamation	$350,000	$0	$350,000
ERT	$100,000	$0	$100,000
Remedial Branch	$100,000	$0	$100,000
Subtotal, Extramural Costs:	$560,000	$0	$0
Contingency (20 %)	$60,000	$0	$60,000
TOTAL SITE BUDGET	$4,680,000	$300,000	$4,980,000

VII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

If action is significantly delayed or not taken, there will be a continued release of the CERCLA listed hazardous substance, sulfuric acid at or below RCRA hazardous waste (D002) levels into the environment increasing the possibility of exposure to the public and to environment. In addition, the public will potentially be exposed to unsafe levels of cyanide.

VIII. OUTSTANDING POLICY ISSUES

None

IX. ENFORCEMENT

ERRB anticipates that this will be a fund-lead response. The OSC will continue to coordinate with the CERCLA Office of Legal Support on enforcement strategy. See attached Enforcement Addendum for detailed enforcement strategy information.

The total EPA costs for this removal action based on full-cost accounting practices that will be eligible for cost recovery are estimated to be $7,099,592.50[1].
[($4,980,000+ $25,000) + (41.85% of $5,005,000)]

X. RECOMMENDATION

This decision document represents the selected removal action for the Barite Hill Mine Site in McCormick, McCormick County, South Carolina, developed in accordance with CERCLA, as amended, and not inconsistent with the NCP. This decision is based on the administrative record for the Site.

Conditions at the Site meet the NCP section 300.415(b)(2) criteria for a removal action. I recommend your approval of the Action Memorandum to allow continued removal response. The total project ceiling if approved will be $4,980,000. Of this, an estimated $3,870,000 comes from the Regional Removal Allowance.

Approval: _____ Date: 9/1/09
Franklin E. Hill, Director
Superfund Division

Disapproval: _____ Date: _____
Franklin E. Hill, Director
Superfund Division

Attachment A

[1]Direct costs include direct extramural costs and direct intramural costs. Indirect costs are calculated based on an estimated indirect cost rate expressed as a percentage of site-specific direct costs, consistent with the full cost accounting methodology effective October 2, 2000. These estimates do not include pre-judgment interest, do not take into account other enforcement costs, including Department of Justice costs, and may be adjusted during the course of the removal action. The estimates are for illustrative purposes only and their use is not intended to create any rights for responsible parties. Neither the lack of a total cost estimate nor deviation of actual total costs from this estimate will affect the United States' right to cost recovery.